NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

401 559

42765

S/185/62/007/010/007/020
D234/D308

STEP

AUTHORS: Klymyshyn, I. A. and Kravchuk, A. L.

TITLE: Increase of radiation intensity before a shock wave reaches the surface of a homogeneous medium

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 10, 1962, 1083-1088

TEXT: It is assumed that the shock wave moves with constant velocity and the energy F radiated from a surface unit of the front is independent of time. The amount of energy $J(u)$ radiated from $u = -\infty$ to u, when the wave reaches an optical depth $(u_0 - u)v$, is computed by integrating the probability function given by V. V. Sobolev; $u = t/t_1$, t_1 being the average duration of a quantum in absorbed state; v is the dimensionless velocity of the wave:

Card 1/3

$$J(u) = \frac{F}{v^2(1 - a^2)} \left[Q_1 e^{-(u_0-u)v\sqrt{\alpha_1}} + Q_2 e^{-(u_0-u)v\sqrt{\alpha_2}} + Q_3 e^{-(u_0-u)v\sqrt{\alpha_3}}\right] \qquad (9)$$

Here $a^2 = 1 - \lambda$, λ is the relative amount of scattered energy, α_1, α_2, α_3 are the roots of

$$(a^2 + x^2)^2 + v^2x^2(1 + x^2)^2 = (x^2 + \alpha_1)(x^2 + \alpha_2)(x^2 + \alpha_3) \qquad (7)$$

Q_1, Q_2, Q_3 depend on these roots, and on v and a. Simplified expressions are obtained for several special cases. If the velocity

Card 2/3

is 100 km/sec and the density $n = 10^{12}$ cm^{-3} brightness increases e times in 10^{-5} sec near spectral line frequency. The above expression does not apply to rarefied media if the frequency is near that of a spectral line. The authors thank Professor S. A. Kaplan for the formulation of the subject of the paper.

ASSOCIATION: L'vivs'kyy derzhuniversytet im. Iv. Franka (L'viv State University im. Iv. Franko)

SUBMITTED: March 2, 1962